

REPORT

13.

TO THE

LOCAL GOVERNMENT BOARD

ON A

DISEASE IN SHIP RATS DUE TO TRYPANOSOMATA.

By

DR. E. KLEIN, F.R.S.



LONDON:

PRINTED FOR HIS MAJESTY'S STATIONERY OFFICE,
By DARLING & SON, LTD., 34-40, BACON STREET, E.

1909.

WITH THE MEDICAL OFFICER'S
COMPLIMENTS.

MEDICAL DEPARTMENT,
LOCAL GOVERNMENT BOARD,
WHITEHALL, S.W.

[M. D. 21.]

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*Prefatory Note by the Medical Officer of the Local
Government Board.*

The accompanying report by Dr. Klein draws attention to a disease in rats which might, unless its true character were recognised, be confused with Rat Plague. It is now printed for distribution in order that those responsible for the examination of rats in connection with suspected outbreaks of Rat Plague may be advised of the possibility of mistake.

A. N.

September 18th, 1909.

REPORT ON MORTALITY AMONGST SHIP RATS DUE TO
TRYPANOSOMATA : BY DR. E. KLEIN, F.R.S.

On July 8th, 1909, I received from the Local Government Board a box containing a dead rat from the S.S. Miles Coverdale, of Hartlepool, which ship had arrived at Bristol on July 4th from Alexandria.

During discharge of the cargo four or five dead rats were found; these appeared to have died on the passage. The rat sent is stated to have died in the morning of the 7th July. When I received it the rat must have been dead about 28-30 hours.

This rat was a big black *Mus rattus*; it was in good state of preservation. The post-mortem examination showed the following condition:—No enlarged lymph-glands could be detected, the spleen was slightly enlarged, dark in colour. Film specimens were stained, they showed no bacilli of any kind. The liver was enlarged, somewhat dark in colour, and showing fairly numerous congested patches, purple in colour. No bacilli could be discovered in stained film specimens. The thoracic cavity contained a considerable amount of free blood, both lungs showed extensive hæmorrhages; no bacilli could be found either in the free blood of the thorax or in films of the lung blood. But in the fresh microscopic specimens, both of the free blood of the thoracic cavity and of the blood of the hæmorrhagic patches of the lungs, great numbers of actively motile Trypanosomata were conspicuous. In every field of the microscope (magnified 300) several dozen could be counted.

In film specimens stained with Methylblue-Eosin the Trypanosomata, by their size, shape, and structure, could be readily identified as *Trypanosoma lewisi*. Amongst the normal looking forms some circular forms could be found here and there, which correspond to the *mis-en-boule* of Laveran and Mesnil, and which, according to MacNeal, represent degenerative forms. (See literature Sleeping Sickness Bureau, Bulletin N. 8, 1909.)

These observations showed that most of these Trypanosomata were still in a living (motile) state about 28-30 hours after death of the rat. This is in so far interesting, as, according to many observers, particularly with regard to other species of *Trypanosoma*—*brucei*, *equiperdum*, *evansi*, *gambiense*—vitality ceases a few hours after death of the infected host. (Sleeping Sickness Bureau, Bulletin N. 8, 1909, p. 294.) Novy and MacNeal, however, found that the rat *Trypanosoma* is far less sensitive to post-mortem changes in the blood than *T. brucei*.

The pathological condition of the lungs and thoracic cavity, combined with the swarming of the blood with living *Trypanosoma*, suggest that the Trypanosomata were the cause* of the death of the rat. Although it is known that in both *Mus decumanus* and

* Cultures and inoculations of a guinea pig with the blood of the hæmorrhagic lung of the rat yielded negative results quâ Plague or other bacillary infection.

Mus rattus the *Trypanosoma lewisi* causes occasionally, though rarely, a fatal issue (Doflein: Die Protozoen als Parasiten und Krankheitserreger, p. 63), it is important to note that mortality amongst ship rats may be—as in this case it would seem to have been—due to this cause, and in future inquiries Trypanosomiasis as a possible cause of mortality amongst ship rats will have to be borne in mind.

Experiments with the Blood Trypanosoma of the Bristol Rat.

With a mixture of the sanguineous fluid of the lungs and the blood in the thorax subcutaneous injection was made into two white mice and one guinea-pig, using for each animal appreciable amounts ($\frac{1}{3}$ – $\frac{1}{2}$ cc.) of the fluid swarming with the living *Trypanosoma*. The guinea-pig remained lively and quite normal. Its peripheral blood was examined for the presence of *Trypanosoma* on the 5th, 6th, 8th, 11th, 15th and 19th day after injection, but with totally negative result.

The two mice appeared affected on the fifth day. They seemed quiet and somnolent, did not feed, one mouse more so than the other. This mouse was killed. The heart blood, the lung juice, the blood of the liver and of the spleen were examined for *Trypanosoma* with totally negative result. The post-mortem examination of all these viscera did not reveal any noticeable pathological change. With the mixture of all these tissues (about $\frac{1}{2}$ cc. sanguineous fluid) one adult white rat was injected subcutaneously with totally negative result.

The second mouse seemed to have recovered on the sixth day—being again lively and feeding; it remained well; its peripheral blood was examined for *Trypanosoma* on the 5th, 8th, 10th, 12th and 17th day with negative result.

The negative results on the guinea-pig and the mice accords with the above diagnosis of *Trypanosoma lewisi*, since these animals are, as a rule, quite refractory to this species of *Trypanosoma*.

Examination of Section of the Hardened Lung and Liver of the Bristol Rat.

The hæmorrhagic portions of the lung and of the liver of the Bristol rat were hardened in suitable fluid (Müllers' fluid, then $\frac{2}{3}$ alcohol, then pure alcohol); thin sections were prepared, stained with Methylblue-Eosin and mounted. Microscopic examination of the lung showed the following:—All parts—alveoli, infundibula, bronchi and peribronchial tissue—were filled with blood in substance; amongst this blood appeared small and large clusters of what corresponded to masses of *Trypanosoma*, their bodies more or less granular; no bacilli of any kind could be found anywhere. In the sections through the liver the intralobular capillaries were found distended by blood, the interlobular veins were in the same condition and containing small groups of *Trypanosoma*, whose bodies were granular. The liver cells everywhere swollen and their substance coarsely granular. No bacilli could be found anywhere.